

WHAT IS CLAIMED IS:

1. A method for reducing pathogenic microorganisms in a food product comprising:
contacting the food product with an acidic composition, wherein the acidic composition comprises an organic acid in an amount ranging from about 40,000 ppm to about 300,000 ppm.
2. The method of claim 1, wherein the organic acid is selected from the group consisting of propionic acid, lactic acid, acetic acid, butyric acid, citric acid, glycolic acid, pyruvic acid, ascorbic acid, benzoic acid, sorbic acid, gluconic acid, and a mixture thereof.
3. The method of claim 1, wherein the amount of the organic acid ranges from about 45,000 ppm to about 250,000 ppm.
4. The method of claim 1, wherein the amount of the organic acid ranges from about 50,000 ppm to about 150,000 ppm.
5. The method of claim 1, wherein the acidic composition further comprises an acidulant, and wherein the acidulant is a strong inorganic acid or an acidic salt.
6. The method of claim 5 wherein the inorganic acid is sulfuric acid, phosphoric acid, hydrochloric acid, or a mixture thereof.
7. The method of claim 5 wherein, based on the total weight of the composition, the inorganic acid ranges from about 1 % to about 85 %.
8. The method of claim 5, wherein the pH of the acidic composition is from about 1.0 to about 5.0.
9. The method of claim 5, wherein the acidic salt is a mono-basic salt of phosphoric acid or a Group I bisulfate salt.

10. The method of claim 5, wherein the acidic salt is a Group I or II mono-basic salt of phosphoric acid.
11. The method of claim 1, wherein the acidic composition further comprises an additive.
12. The method of claim 11, wherein the additive comprises a metal salt, and wherein the metal salt is of an organic acid or an inorganic acid.
13. The method of claim 12, wherein the metal salt is a Group I or Group II metal salt of an organic acid or an inorganic acid.
14. The method of claim 12, wherein the metal salt is a metal salt of an organic acid, and wherein the amount of the metal salt ranges from about 5000 ppm to about 60,000 ppm.
15. The method of claim 14, wherein the amount of the metal salt ranges from about 10,000 ppm to about 55,000 ppm.
16. The method of claim 14, wherein the amount of the metal salt ranges from about 20,000 ppm to about 50,000 ppm.
17. The method of claim 12, wherein the metal salt is a metal salt of an inorganic acid, and wherein the amount of the metal salt ranges from about 5000 ppm to about 50,000 ppm.
18. The method of claim 17, wherein the amount of the metal salt ranges from about 10,000 ppm to about 40,000 ppm.
19. The method of claim 17, wherein the amount of the metal salt ranges from about 15,000 ppm to about 30,000 ppm.
20. The method of claim 12, wherein the metal salt is a Group I or II salt of sulfuric acid, phosphoric acid, or hydrochloric acid.

21. The method of claim 12, wherein the metal salt is a salt of propionic acid, lactic acid, acetic acid, butyric acid, citric acid, glycolic acid, pyruvic acid, ascorbic acid, benzoic acid, sorbic acid, or gluconic acid.
22. The method of claim 11, wherein the additive comprises a metal salt, and wherein the metal salt is created by adding base material to the acidic composition.
23. The method of claim 22, wherein the base material is a Group I or II hydroxide.
24. The method of claim 22, wherein the base material is a Group I or II carbonate.
25. The method of claim 22, wherein the amount of the base material ranges from about 5000 ppm to about 60,000 ppm.
26. The method of claim 22, wherein the amount of the base material ranges from about 10,000 ppm to about 40,000 ppm.
27. The method of claim 22, wherein the amount of the base material ranges from about 15,000 ppm to about 30,000 ppm.
28. The method of claim 11, wherein the additive comprises an alcohol.
29. The method of claim 28, wherein the alcohol is ethanol.
30. The method of claim 28, wherein, based on the final volume of the composition, the amount of the alcohol ranges from about 0.025% to about 5%.
31. The method of claim 28, wherein, based on the final volume of the composition, the amount of the alcohol ranges from about 0.05% to about 2%.
32. The method of claim 28, wherein, based on the final volume of the composition, the amount of the alcohol ranges from about 0.075% to about 1%.
33. The method of claim 11, wherein the additive comprises a surfactant.

34. The method of claim 33, wherein the surfactant is anionic, nonionic, amphoteric, or a mixture thereof.
35. The method of claim 33, wherein the surfactant is polypropyleneglycol, polysorbate, SDS, LAS, DBSA, or a mixture thereof.
36. The method of claim 33, wherein the amount of the surfactant ranges from about 100 ppm to about 20,000 ppm.
37. The method of claim 33, wherein the amount of the surfactant ranges from about 250 ppm to about 10,000 ppm.
38. The method of claim 33, wherein the amount of the surfactant ranges from about 500 ppm to about 5000 ppm.
39. The method of claim 33, wherein the acidic composition further comprises oleic acid.
40. The method of claim 11, wherein the additive comprises a peroxide.
41. The method of claim 40, wherein the peroxide is hydrogen peroxide, calcium peroxide, peracetic acid, or sodium peroxide.
42. The method of claim 40, wherein the amount of the peroxide ranges from about 25 ppm to about 150 ppm.
43. The method of claim 40, wherein the amount of the peroxide ranges from about 40 ppm to about 90 ppm.
44. The method of claim 40, wherein the amount of the peroxide ranges from about 50 ppm to about 80 ppm.
45. The food product prepared in accordance with the method of claim 11.

46. The method of claim 11, wherein the food product is a ready-to-eat food product or an animal carcass.
47. The ready-to-eat food product prepared in accordance with the method of claim 46.
48. The method of claim 1, wherein the food product is a ready-to-eat food product or an animal carcass.
49. The method of claim 45, wherein the ready-to-eat food product is a ready-to-eat meat product.
50. The method of claim 1, wherein the food product is a prepared dough.
51. The food product prepared in accordance with the method of claim 1.
52. The ready-to-eat food product prepared in accordance with the method of claim 45.
53. The animal carcass prepared in accordance with the method of claim 45.
54. The ready-to-eat meat product prepared in accordance with the method of claim 46.
55. The prepared dough prepared in accordance with the method of claim 47.
56. A method for reducing pathogenic microorganisms in a ready-to-eat food product comprising:
 - contacting the food product with an acidic composition, wherein the acidic composition comprises an acidulant, wherein the acidulant is a low pH solution of sparingly-soluble Group IIA-complexes ("AGIIS"), a highly acidic metalated organic acid ("HAMO"), or a highly acidic metalated mixture of inorganic acids ("HAMMIA").

57. The method of claim 56, wherein the AGIIS is isolated from a mixture comprising a mineral acid and a Group IIA hydroxide, or a Group IIA salt of a dibasic acid, or a mixture of the two.
58. The method of claim 57, wherein the Group IIA hydroxide is calcium hydroxide, the mineral acid is sulfuric acid, and the Group IIA salt of a dibasic acid is calcium sulfate.
59. The method of claim 56, wherein, based on the total weight of the composition, the AGIIS ranges from about 1 % to about 85 %.
60. The method of claim 56, wherein the highly acidic metalated organic acid ("HAMO") is prepared by mixing ingredients comprising:
at least one regenerating acid having a first number of equivalents;
at least one metal base having a second number of equivalents; and
at least one organic acid, and
wherein the first number of equivalents of the regenerating acid is greater than that of the second number of equivalents of the metal base.
61. The method of claim 60, wherein the regenerating acid comprises a strong oxyacid of sulfur, phosphorus, nitrogen, chromium, or iodine.
62. The method of claim 60, wherein the regenerating acid comprises a strong oxyacid of molybdenum, tungsten, or selenium.
63. The method of claim 60, wherein the regenerating acid comprises sulfuric acid, phosphoric acid, or an acidic solution of sparingly-soluble Group IIA complexes.
64. The method of claim 63, wherein the acidic solution of sparingly-soluble Group IIA complexes is prepared by mixing ingredients comprising a mineral acid and a Group IIA hydroxide, or a Group IIA salt of a dibasic acid, or a mixture thereof.

65. The method of claim 64, wherein the Group IIA hydroxide comprises calcium hydroxide, the mineral acid comprises sulfuric acid, and the Group IIA salt of the dibasic acid comprises calcium sulfate.
66. The method of claim 60, wherein the metal base comprises a hydroxide, a carbonate, a bicarbonate, or an oxide of a metal.
67. The method of claim 60, wherein the metal base comprises a base of a Group IA element.
68. The method of claim 60, wherein the metal base comprises a base of a Group IIA element, but not beryllium.
69. The method of claim 60, wherein the metal base comprises a base of a Group IIIA element, but not boron.
70. The method of claim 60, wherein the metal base comprises a base of a metal of the first transition series.
71. The method of claim 60, wherein the metal base comprises a base of magnesium, calcium, ferrous, copper, or zinc.
72. The method of claim 60, wherein the metal base comprises a base of lead, bismuth, or tin.
73. The method of claim 56, wherein the highly acidic metalated mixture of inorganic acids ("HAMMIA") is prepared by mixing ingredients comprising:
a salt of phosphoric acid; and
a preformed, or in-situ generated, solution or suspension of an acidic sparingly-soluble Group IIA complex ("AGIIS"), wherein the solution or suspension of AGIIS is in an amount sufficient to render the acidic pH of the composition to be less than about 2.

74. The method of claim 73, wherein the solution or suspension of AGIIS is isolated from a mixture comprising a mineral acid and a Group IIA hydroxide, or a Group IIA salt of a dibasic acid, or a mixture of the two.
75. The method of claim 74, wherein the Group IIA hydroxide is calcium hydroxide, the mineral acid is sulfuric acid, and the Group IIA salt of a dibasic acid is calcium sulfate.
76. The method of claim 73, wherein the salt of phosphoric acid comprises a divalent metal salt of phosphoric acid.
77. The method of claim 76, wherein the divalent metal comprises an alkali earth metal or a metal of first transition series.
78. The method of claim 73, wherein the salt of phosphoric acid comprises a mono-valent metal salt of phosphoric acid.
79. The method of claim 78, wherein the mono-valent metal comprises an alkali metal.
80. The method of claim 56, wherein the acidic composition further comprises an organic acid in an amount ranging from about 40,000 ppm to about 300,000 ppm.
81. The method of claim 80, wherein the organic acid is selected from the group consisting of propionic acid, lactic acid, acetic acid, butyric acid, citric acid, glycolic acid, pyruvic acid, ascorbic acid, benzoic acid, sorbic acid, gluconic acid, and a mixture thereof.
82. The method of claim 80, wherein the amount of the organic acid ranges from about 45,000 ppm to about 250,000 ppm.
83. The method of claim 80, wherein the amount of the organic acid ranges from about 50,000 ppm to about 150,000 ppm.

84. The method of claim 80, wherein the pH of the acidic composition is from about 1.0 to about 5.0.
85. The method of claim 56, wherein the acidic composition further comprises an additive.
86. The method of claim 85, wherein the additive comprises a metal salt, and wherein the metal salt is of an organic acid or an inorganic acid.
87. The method of claim 86, wherein the metal salt is a Group I or Group II metal salt of an organic acid or an inorganic acid.
88. The method of claim 86, wherein the metal salt is a metal salt of an organic acid, and wherein the amount of the metal salt ranges from about 5000 ppm to about 60,000 ppm.
89. The method of claim 88, wherein the amount of the metal salt ranges from about 10,000 ppm to about 55,000 ppm.
90. The method of claim 88, wherein the amount of the metal salt ranges from about 20,000 ppm to about 50,000 ppm.
91. The method of claim 86, wherein the metal salt is a metal salt of an inorganic acid, and wherein the amount of the metal salt ranges from about 5000 ppm to about 50,000 ppm.
92. The method of claim 91, wherein the amount of the metal salt ranges from about 10,000 ppm to about 40,000 ppm.
93. The method of claim 91, wherein the amount of the metal salt ranges from about 15,000 ppm to about 30,000 ppm.
94. The method of claim 86, wherein the metal salt is a Group I or II salt of sulfuric acid, phosphoric acid, or hydrochloric acid.

95. The method of claim 86, wherein the metal salt is a salt of propionic acid, lactic acid, acetic acid, butyric acid, citric acid, glycolic acid, pyruvic acid, ascorbic acid, benzoic acid, sorbic acid, or gluconic acid.
96. The method of claim 85, wherein the additive comprises a metal salt, and wherein the metal salt is created by adding base material to the acidic composition.
97. The method of claim 96, wherein the base material is a Group I or II hydroxide.
98. The method of claim 96, wherein the base material is a Group I or II carbonate.
99. The method of claim 96, wherein the amount of the base material ranges from about 5000 ppm to about 60,000 ppm.
100. The method of claim 96, wherein the amount of the base material ranges from about 10,000 ppm to about 40,000 ppm.
101. The method of claim 96, wherein the amount of the base material ranges from about 15,000 ppm to about 30,000 ppm.
102. The method of claim 85, wherein the additive comprises an alcohol.
103. The method of claim 102, wherein the alcohol is ethanol.
104. The method of claim 102, wherein, based on the final volume of the composition, the amount of the alcohol ranges from about 0.025% to about 5%.
105. The method of claim 102, wherein, based on the final volume of the composition, the amount of the alcohol ranges from about 0.05% to about 2%.
106. The method of claim 102, wherein, based on the final volume of the composition, the amount of the alcohol ranges from about 0.075% to about 1%.
107. The method of claim 85, wherein the additive comprises a surfactant.

108. The method of claim 107, wherein the surfactant is anionic, nonionic, amphoteric, or a mixture thereof.
109. The method of claim 107, wherein the surfactant is polypropyleneglycol, polysorbate, SDS, LAS, DBSA, or a mixture thereof.
110. The method of claim 107, wherein the amount of the surfactant ranges from about 100 ppm to about 20,000 ppm.
111. The method of claim 107, wherein the amount of the surfactant ranges from about 250 ppm to about 10,000 ppm.
112. The method of claim 107, wherein the amount of the surfactant ranges from about 500 ppm to about 5000 ppm.
113. The method of claim 107, wherein the acidic composition further comprises oleic acid.
114. The method of claim 85, wherein the additive comprises a peroxide.
115. The method of claim 114, wherein the peroxide is hydrogen peroxide, calcium peroxide, peracetic acid, or sodium peroxide.
116. The method of claim 114, wherein the amount of the peroxide ranges from about 25 ppm to about 150 ppm.
117. The method of claim 114, wherein the amount of the peroxide ranges from about 40 ppm to about 90 ppm.
118. The method of claim 114, wherein the amount of the peroxide ranges from about 50 ppm to about 80 ppm.
119. The method of claim 85, wherein the ready-to-eat food product is a ready-to-eat meat product.

- 120. The ready-to-eat food product prepared in accordance with the method of claim 85.
- 121. The ready-to-eat meat product prepared in accordance with the method of claim 119.
- 122. The method of claim 56, wherein the ready-to-eat food product is a ready-to-eat meat product.
- 123. The ready-to-eat food product prepared in accordance with the method of claim 56.
- 124. The ready-to-eat meat product prepared in accordance with the method of claim 123.